

Math 1210-1 Test 2

Name: _____

ST# _____

Show all your work in a neat and organized manner. Write your answers and solutions in the space provided. Please box your answers. You may NOT use a calculator.

Math 1210-1 Test 2

1. (12 pts) Find $f'(x)$ for the following: (**Do not simplify.**)

(a) $f(x) = (x^2 - 5x + 9)^{1/2}$

(b) $f(x) = \frac{\cos x}{x^3 - 6x}$

(c) $f(x) = 5x^2 \sin x$

2. (5 pts) Find $\frac{d^4 y}{dx^4}$ if $y = x^7 - 3x^5 + 9x^3 - 27x + 14$.

3. (6 pts) Define the following:

(a) Derivative (formal definition please)

(b) Operator

4. (8 pts) The curve γ is given implicitly by $x^2 + 2xy^2 + 5y = x + 1$. Find the slope of the line ℓ which is tangent to γ at $(2, -1)$.
5. (5 pts) Suppose that a tumor in a person's body has a spherical shape and that treatment is causing the radius of the tumor to decrease at a rate of 2 millimeters per month. At what rate is the volume decreasing when the radius is 3 millimeter? (Recall that $V = \frac{4}{3}\pi r^3$.)
6. (10 pts) Farmer Bob wants to enclose part of his yard for his chickens. The enclosure will be rectangular, and one side of the yard will be against his barn. If he has 100 feet of fencing, what is the largest chicken pen he can enclose? (Draw a picture and label the sides.)
7. (4 pts) Bill traveled 160 miles in 2 hours and claimed he never exceeded 75 mph. Disprove Bill's claim.

8. (10 pts) A function f has the following properties:

- (a) f is a continuous function
- (b) $f(-1) = 0.5, f(0) = 0, f(1) = -1$
- (c) $f'(-1) = f'(1) = 0$
- (d) $f'(x) < 0$ for $x < 1$ and $f'(x) > 0$ for $x > 1$
- (e) $f''(-1) = f''(0) = 0$
- (f) $f''(x) > 0$ for $x < -1$ and $x > 0$
- (g) $f''(x) < 0$ for $-1 < x < 0$

Graph $y = f(x)$ on the window provided. Mark all interesting points on your graph and state what type of point they are.

